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# Work disability and factors associated with work productivity loss in ankylosing spondylitis

## Ankilozan spondilitte iş engelliliği ve iş verimliliği kaybı ile ilişkili faktörler

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## ABSTRACT

**Objective**: To assess the rate of employment and factors associated with work productivity loss in Ankylosing spondylitis (AS).

**Material and Method**: This study was designed as a cross-sectional study that included 70 patients with AS. Fatigue, morning stiffness, and pain were assessed on a visual analogue scale (VAS). Disease activity, physical function, quality of life, anxiety and depression were assessed using the Bath Ankylosing Spondylitis Disease Activity Index (BASDAI), Bath Ankylosing Spondylitis Functional Index (BASFI), Ankylosing Spondylitis Quality of Life (ASQoL), and Hospital Anxiety and Depression Scale (HAD), respectively. We used the Work Productivity and Activity Impairment Questionnaire (WPAI) to determine the impact of AS on work productivity. The clinical and demographic characteristics of working and not working patients were compared. Factors associated with absenteeism and presenteeism were assessed using univariable logistic and linear regression analysis, respectively.

**Results**: Mean age of 70 patients (24 women, 46 men) with AS was 42.96 ± 7.83 years. The percentages of working patients was 65.7%. The percentages of presenteeism and absenteeism were 60.21% and 37%, respectively. The clinical and demographic characteristics of working and not working patients were not different (p>0.05). Absenteeism was associated with low educational level (odds ratio [OR]=7.636; 95% confidence interval [CI]=1.782-32.723; p=0.006), morning stiffness (OR=1.545; 95% CI=1.118-2.134; p=0.008), BASDAI (OR=1.645; 95% CI=1.088-2.489; p=0.018), and ASQoL (OR=1.392; 95% CI=1.094-1.772; p=0.007). In the linear regression model, BASDAI (β=8.394; 95% CI=5.570-11.217; p<0.001), fatigue (β=6.656; 95% CI=3.015-10.298; p=0.001), pain (β=6.011; 95% CI=2.669-9.352; p=0.001), morning stiffness (β=6.108; 95% CI=3.949-8.268; p<0.001), BASFI (β=5.703; 95% CI=2.701-8.705; p< 0.001), ASQoL (β=3.209; 95% CI=1.781-4.637; p<0.001), and HAD-A (β=2.095; 95% CI=0.243-3.947; p=0.027) were significantly associated with presenteeism.

**Conclusion**: The percentage of absenteeism and presenteeism were high in working AS patients. Absenteeism was associated with low educational level, morning stiffness, and disease activity. Presenteeism was associated with patient-reported outcomes, including fatigue, pain, morning stiffness, function, anxiety, quality of life, and disease activity.

**Keywords**: Ankylosing spondylitis, absenteeism, presenteeism, patient-reported outcomes

## ÖZ

**Amaç**: Ankilozan spondilitte (AS) çalışma durumunu ve iş verimliliği kaybıyla ilişkili faktörleri değerlendirmek.

**Gereç ve Yöntem:** Bu kesitsel çalışmaya 70 AS tanılı hasta dahil edildi.Yorgunluk, sabah tutukluğu ve ağrı visual analog skala (VAS) kullanılarak değerlendirildi. Hastalık aktivitesi, fiziksel fonksiyon, yaşam kalitesi, anksiyete ve depresyon sırasıyla Bath Ankilozan Spondilit Hastalık Aktivite İndeksi (BASDAI), Bath Ankilozan Spondilit Fonksiyonel İndeksi (BASFI), Ankilozan Spondilit Yaşam Kalitesi (ASQoL), Hastane Anksiyete ve Depresyonu (HAD) ölçeği kullanılarak değerlendirildi. AS'nin iş verimliliği üzerindeki etkisini belirlemek için İş Verimliliği ve Faaliyet Bozulması Anketini (WPAI) kullanıldı. Çalışan ve çalışmayan hastaların klinik ve demografik özellikleri karşılaştırıldı. Absenteeism ve presenteeism ile ilişkili faktörler, sırasıyla univariable lojistik ve doğrusal regresyon analizi kullanılarak değerlendirildi.

**Bulgular**: AS'li 70 hastanın (24 kadın, 46 erkek) yaş ortalaması 42,96 ± 7,83 yıl idi. Çalışan hasta oranı %65,7 idi. Presenteeism ve absenteeism oranları sırasıyla %60,21 ve %37'dir. Çalışan ve çalışmayan hastaların klinik ve demografik özellikleri farklı değildi (p>0.05). Absenteeism, düşük eğitim seviyesi (odds ratio [OR]=7,636; 95% confidence interval [CI]=1,782-32,723; p=0,006), sabah tutukluğu (OR=1,545; 95% CI=1,118-2,134; p=0,008), BASDAI (OR=1,645; 95% CI=1,088-2,489; p=0,018), ve ASQoL (OR=1,392; 95% CI=1,094-1,772; p=0,007) ile ilişkiliydi. Univariable linear regression modelinde, presenteeism BASDAI (β=8,394; 95% CI=5,570-11,217; p<0,001), yorgunluk (β=6,656; 95% CI=3,015-10,298; p=0,001), ağrı (β=6,011; 95% CI=2,669-9,352; p=0,001), sabah tutukluğu (β=6,108; 95% CI=3,949-8,268; p<0,001), BASFI (β=5,703; 95% CI=2,701-8,705; p< 0,001), ASQoL (β=3,209; 95% CI=1,781-4,637; p<0,001), ve anksiyete (β=2,095; 95% CI=0,243-3,947; p=0,027) ile ilişkili bulundu.

**Sonuç**: Çalışan AS hastalarında absenteeism ve presenteeism yüzdesi yüksekti. Absenteeism, düşük eğitim düzeyi, sabah tutukluğu, hastalık aktivitesi ile ilişkiliydi. Presenteeism, yorgunluk, ağrı, sabah tutukluğu, fonksiyon, anksiyete, yaşam kalitesi ve hastalık aktivitesi dahil olmak üzere hasta tarafından bildirilen sonuçlarla ilişkiliydi.

**Anahtar Kelimeler:** Ankilozan spondilit, absenteeism, presenteeism

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## INTRODUCTION

Ankylosing spondylitis (AS) is a chronic disease with axial inflammation (1), which not only impairs physical function and quality of life but also causes a significant economic burden (2-4). Pain, morning stiffness, fatigue, sleep quality, and spinal mobility affect function and quality of life in AS (5).

AS typically affects people of working age, with an impact on work productivity as well (6). It has been reported that the rate of quitting work in AS is three times higher than in the general population, with 20% in ten years and 30% in 20 years (7). Thirty-one per cent of the patients reported being work-disabled, and 15% reported a reduction in working hours or changing jobs due to AS (8).

Work disability is one of the key patient-reported outcomes, which includes reduced working hours, job loss, and early retirement due to disease (8,9). Work productivity loss includes reduced on-the-job effectiveness (presenteeism) as well as work time missed (absenteeism) due to illness (10). Work disability in AS seems to be associated with age, physical function, disease duration, disease activity, depression, physically demanding jobs, and lower educational levels (9,11,12), and the effect of drug treatments on work disability has been demonstrated (13).

Work disability and productivity are important patient-reported outcome measures for assessing the impact of AS, and prevention of work disability is an important goal of treatment. Therefore, it is essential to assess the impairment at work and be aware of its associated factors in AS. The present study aimed to identify the employment status of AS patients, differences among working and not working patients, and factors associated with presenteeism and absenteeism in AS.

## MATERIAL AND METHOD

The study was carried out with the permission of Marmara University Faculty of Medicine Clinical Researches Ethics Committee (Date: 11.08.2018, Decision No: 09.2018.650). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki. Informed consent was obtained from all the participants.

### Study Design and Patients

This cross-sectional study included patients with AS who are members of the Ankylosing Spondylitis Patient Society (ASHAD) web page. The questionnaire prepared for the study was sent to the patients via e-mail, and data was collected by this self-administered questionnaire.

### Demographic and Clinical Variables

Data on age, sex, educational status, disease duration (years), age at diagnosis, and body mass index (BMI) were collected. The Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) was used to assess disease activity.

### Patient-Reported Outcome Measures

Fatigue, pain, morning stiffness, and patient global assessment (PtGA) were evaluated separately with a visual analogue scale (VAS). Psychological well-being was evaluated using the Hospital Anxiety and Depression Scale for Anxiety (HAD-A) and Depression (HAD-D) (14). The physical disability and health-related quality of life were assessed using the Bath Ankylosing Spondylitis Functional Index (BASFI) and Ankylosing Spondylitis Quality of Life (ASQOL), respectively (15, 16).

### Working status and work productivity

We classified the patients according to their working status as employed (working full-time or part-time) or not working. Patients were asked whether they had reduced working hours, changed jobs, quit their job, or retired early due to AS. We used the Work Productivity and Activity Impairment questionnaire (WPAI) to determine work productivity (17,18). WPAI gives four different domains based on six questions. The results are expressed as percentages, with higher percentages indicating greater degradation. We evaluated the percentage of presenteeism and the presence of absenteeism.

### Statistical Analysis

Variables were given as frequency, percentages, mean, standard deviation, median, minimum, maximum, 25th and 75th percentiles. Comparisons of groups were performed using the Chi-square and Fisher's exact tests for categorical variables and the Mann-Whitney U test for continuous variables. Univariable logistic and linear regression analyses were used to determine the associations of absenteeism and presenteeism (dependent variables) with demographic and clinical features and patient-reported outcomes, including fatigue, pain, morning stiffness, HAD-A, HAD-D, ASQoL, and BASFI, respectively. Statistical significance was set at $p<0.05$. SPSS Statistics (IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp) was used for statistical analysis.

## RESULTS

The mean age of 70 patients (24 women, 46 men) with AS was 42.96±7.83 years. The mean age at diagnosis was 31.75±9.41, and disease duration was 11.27±9.11 years.

According to working status, 65.7% of the patients were working. Patients stated that 34.3% of them quit jobs, 31.4% changed jobs, 48.6% reduced their working hours, and 10% retired early due to AS. The mean percentage of presenteeism was 60.21±26.11. The percentage of the patient with absenteeism was 37%.

Comparisons of the characteristics of working and not working AS patients are given in **Table 1.** The age, gender, BMI, educational level, age at diagnosis, disease duration, BASDAI, BASFI, ASQoL, fatigue, pain, morning stiffness, PtGA, HAD-A, and HAD-D were similar between working and not working patients (p>0.05).

**Table 1.** Comparison of working and not working patients with AS

| | Not Working N = 24 | Working N = 46 | P value |
|---|---|---|---|
| Age, median (25-75%) | 43 (37-53) | 41 (36-47) | 0.099 |
| Male, n (%) | 13 (54.2) | 33 (71.7) | 0.142 |
| Body mass index (kg/m2), median (25-75%) | 26.1 (22.7-28.3) | 26 (24.2-28.2) | 0.592 |
| Educational level, n (%) | | | 0.748 |
| Primary school | 2 (8.3) | 4 (8.7) | |
| Middle school | 2 (8.3) | 7 (15.2) | |
| High school | 10 (41.7) | 14 (30.4) | |
| University | 10 (41.7) | 21 (45.7) | |
| Disease duration (months), median (25-75%) | 12 (5-23) | 8 (4-13) | 0.130 |
| Age at diagnosis, median (25-75%) | 31 (23-42) | 31 (26.5-38) | 0.729 |
| BASDAI, median (25-75%) | 6.9 (5.6-8.7) | 7.8 (5.5-8.4) | 0.512 |
| BASFI, median (25-75%) | 6 (3.6-7.7) | 5 (3.9-7.1) | 0.729 |
| ASQoL, median (25-75%) | 15 (11-16) | 14 (10-17) | 0.985 |
| VAS PtGA, median (25-75%) | 4 (2-5) | 5 (3-5.5) | 0.073 |
| VAS fatigue, median (25-75%) | 8 (7-9) | 8 (6.5-8) | 0.442 |
| VAS morning stiffness, median (25-75%) | 6 (2-8) | 7 (5-9) | 0.222 |
| VAS pain, median (25-75%) | 8 (6-9) | 8 (7-9) | 0.409 |
| HAD anxiety, median (25-75%) | 16 (9-17) | 13 (9.5-15) | 0.339 |
| HAD Depression, median (25-75%) | 12 (8-16) | 10 (7.5-13.5) | 0.244 |

BASDAI: Bath Ankylosing Spondylitis Disease Activity Index; BASFI: Bath Ankylosing Spondylitis Functional Index; ASQoL: Ankylosing Spondylitis Quality of Life; PtGA: patient global assessment; VAS: Visual Analogue Scale; HAD: Hospital Anxiety and Depression.

In working patients, absenteeism was associated with educational level (odds ratio [OR]=7.636; 95% confidence interval [CI]=1.782-32.723; p=0.006), morning stiffness (OR=1.545; 95% CI=1.118-2.134; p=0.008), BASDAI (OR=1.645; 95% CI=1.088-2.489; p=0.018), and ASQoL (OR=1.392; 95% CI=1.094-1.772; p=0.007). In the linear regression model, BASDAI (β=8.394; 95% CI=5.570-11.217; p<0.001), fatigue (β=6.656; 95% CI=3.015-10.298; p=0.001), pain (β=6.011; 95% CI=2.669-9.352; p=0.001), morning stiffness (β=6.108; 95% CI=3.949-8.268; p<0.001), BASFI (β=5.703; 95% CI=2.701-8.705; p<0.001), ASQoL (β=3.209; 95% CI=1.781-4.637; p<0.001), and HAD-A (β=2.095; 95% CI= 0.243-3.947; p=0.027) were significantly associated with presenteeism (**Table 2**). There was no difference in the percentage of presenteeism among AS patients according to gender and education level (p>0.05).

**Table 2.** Univariable logistic and linear regression analysis of factors associated with absenteeism and presenteeism

| Variable | Logistic regression analysis Absenteeism | | Linear regression analysis Presenteeism | |
|---|---|---|---|---|
| | OR (95% CI) | P value | Beta coefficient (95% CI) | P value |
| Age | 0.960 (0.868-1.062) | 0.427 | -0.576 (-1.896-0.743) | 0.383 |
| Gender | 1.714 (0.463-6.346) | 0.420 | - | |
| Body mass index | 1.024 (0.836-1.253) | 0.819 | -0.324 (-2.982-2.335) | 0.807 |
| Educational level | 7.636 (1.782-32.723) | 0.006 | - | |
| Disease duration | 1.023 (0.945-1.107) | 0.574 | 0.478 (-0.600-1.555) | 0.375 |
| Age at diagnosis | 0.978 (0.912-1.050) | 0.541 | -0.706 (-1.607-0.195) | 0.121 |
| BASDAI | 1.645 (1.088-2.489) | 0.018 | 8.394 (5.570-11.217) | <0.001 |
| BASFI | 1.303 (0.980-1.733) | 0.069 | 5.703 (2.701-8.705) | <0.001 |
| ASQoL | 1.392 (1.094-1.772) | 0.007 | 3.209 (1.781-4.637) | <0.001 |
| VAS fatigue | 1.468 (0.951-2.267) | 0.083 | 6.656 (3.015-10.298) | 0.001 |
| VAS pain | 1.516 (0.989-2.324) | 0.057 | 6.011 (2.669-9.352) | 0.001 |
| VAS morning stiffness | 1.545 (1.118-2.134) | 0.008 | 6.108 (3.949-8.268) | <0.001 |
| HAD anxiety | 1.041 (0.894-1.212) | 0.606 | 2.095 (0.243-3.947) | 0.027 |
| HAD depression | 1.113 (0.965-1.283) | 0.142 | 1.634 (-0.030-3.299) | 0.054 |

OR: odds ratio; CI: confidence interval; BASDAI: Bath Ankylosing Spondylitis Disease Activity Index; BASFI: Bath Ankylosing Spondylitis Functional Index; ASQoL: Ankylosing Spondylitis Quality of Life; VAS: Visual Analogue Scale; HAD: Hospital Anxiety and Depression. Significant P-values were presented in bold.

## DISCUSSION

Because of affecting young people of working age, it is important to evaluate adverse work-related outcomes in AS. In the present study, we found high rates of absenteeism and presenteeism in AS patients. We demonstrated that work productivity is associated with patient-reported outcomes such as pain, fatigue, function, and psychological well-being, apart from sociodemographic and clinical characteristics.

In the present study, 65.7% of the patients were employed. Patients stated that 34.3% of them quit jobs, 31.4% changed jobs, 48.6% reduced their working hours, and 10% retired early due to AS. It has been reported that quitting work is three times more common in AS (7). Another study found that 31% of patients were unable to work, and 15% reduced working hours or changed their jobs due to AS (8). In another study from Turkey, 44.6% of the patients changed their job, and 24% retired early due to AS (19). The wide variation in rates of work disability reported among studies is due to methodological differences in these studies and differences in the populations included (13). The

high proportion of young, male patients and the short duration of the disease in our study may have affected these results.

On the other hand, we found that the mean percentages of presenteeism and absenteeism were 60% and 37%, respectively. A recent multicenter study with a large population reported 79% presenteeism and 19% absenteeism in patients with axial spondyloarthritis (20). Data on presenteeism and absenteeism vary widely in the literature, and the level of presenteeism seems to be higher than absenteeism (13,21,22).

In the present study, working and not working AS patients were similar in age, sex, educational level, BMI, disease, disease duration activity, and patient-reported outcomes, including fatigue, pain, morning stiffness, anxiety, depression, function, and quality of life. In previous studies, compared with full-time employment, work disability was found to be related to age, disease duration, low educational level, disease activity, physical disability, pain, fatigue, morning stiffness, anxiety, depression, older age of disease onset, decreased spinal mobility, and hip involvement (8,9,19,23). However, our study could not compare employed patients with work-disabled AS patients due to the low sample size. The not working patient group in our study also included the unemployed, retirees, and housewives.

We found that absenteeism was associated with low educational level, morning stiffness, disease activity, and quality of life. Absenteeism was reported to be correlated with disease activity and physical function in axial spondyloarthritis (21). In another study, several factors, including disease activity and function, as well as a labour-intensive job, quality of life, pain, fatigue, and sleep quality, were associated with absenteeism in axial spondyloarthritis (20). On the other hand, in a recent study, lower education, older age, female gender, and higher disease activity were related to sick leave in axial spondyloarthritis (24). The results of our study are compatible with the literature in some respects, suggesting that patient-related factors other than disease-related factors can also be determinants of absenteeism in AS.

Additionally, we determined that presenteeism was associated with disease activity and patient-reported outcomes, such as fatigue, pain, morning stiffness, anxiety, quality of life, and function in patients with AS. Similarly, presenteeism was found to be associated with patient-reported outcomes, including disease activity, physical function, quality of life, pain, fatigue, sleep disturbance, anxiety, and depression in axial spondyloarthritis (20-22,25). According to our study results, in line with the literature, presenteeism seems to be related to patient-reported outcomes rather than the socioeconomic and clinical characteristics of AS patients.

The main limitation of this study is including a small sample size. Additionally, we could not evaluate sleep quality, spinal mobility, and work type in AS patients, which can affect work productivity. Furthermore, we were unable to perform an adjusted multivariate regression analysis due to the small sample size. Considering that the disease duration may have an impact on work disability, short disease duration was another limitation of this study.

## CONCLUSION

The percentage of presenteeism was higher than absenteeism, and it is associated with patient-reported outcomes, including disease activity, physical function, quality of life, pain, fatigue, morning stiffness, and anxiety in patients with AS. This highlights the importance of continuous evaluation of patient-reported outcome measures in determining the burden of AS. Multicenter prospective studies of work disability in AS patients in the Turkish population are needed, as rates and determinants of work disability may differ significantly between countries depending on socioeconomic status.

## ETHICAL DECLARATIONS

**Ethics Committee Approval:** The study was carried out with the permission of Marmara University Faculty of Medicine Clinical Researches Ethics Committee (Date: 20.04.2022, Decision No: 09.2018.650).

**Informed Consent:** All patients signed the free and informed consent form.

**Referee Evaluation Process:** Externally peer-reviewed.

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## REFERENCES

1. Simone D, Al Mossawi MH, Bowness P. Progress in our understanding of the pathogenesis of ankylosing spondylitis. Rheumatology (Oxford) 2018; 57: 4-9.
2. Boonen A, van der Linden SM. The burden of ankylosing spondylitis. J Rheumatol Suppl 2006; 78: 4-11.
3. Krüger K, von Hinüber U, Meier F, et al. Ankylosing spondylitis causes high burden to patients and the healthcare system: results from a German claims database analysis. Rheumatol Int 2018; 38: 2121-31.

4. Merino M, Braçe O, González-Domínguez A, Hidalgo-Vega Á, Garrido-Cumbrera M, Gratacós J. Social economic costs of ankylosing spondylitis in Spain. Clin Exp Rheumatol 2021; 39: 357-64.
5. van Tubergen A, Black PM, Coteur G. Are patient-reported outcome instruments for ankylosing spondylitis fit for purpose for the axial spondyloarthritis patient? A qualitative and psychometric analysis. Rheumatology (Oxford) 2015; 54: 1842-51.
6. Martindale J, Shukla R, Goodacre J. The impact of ankylosing spondylitis/axial spondyloarthritis on work productivity. Best Pract Res Clin Rheumatol 2015; 29: 512-23.
7. Boonen A, Chorus A, Miedema H, et al. Withdrawal from labour force due to work disability in patients with ankylosing spondylitis. Ann Rheum Dis 2001; 60: 1033-9.
8. Barlow JH, Wright CC, Williams B, Keat A. Work disability among people with ankylosing spondylitis. Arthritis Rheum 2001; 45: 424-9.
9. Healey EL, Haywood KL, Jordan KP, Garratt A, Packham JC. Impact of ankylosing spondylitis on work in patients across the UK. Scand J Rheumatol 2011; 40: 34-40.
10. Escorpizo R, Bombardier C, Boonen A, et al. Worker productivity outcome measures in arthritis. J Rheumatol 2007; 34: 1372-80.
11. Ward MM, Kuzis S. Risk factors for work disability in patients with ankylosing spondylitis. J Rheumatol 2001; 28: 315-21.
12. Boonen A, de Vet H, van der Heijde D, van der Linden S. Work status and its determinants among patients with ankylosing spondylitis. A systematic literature review. J Rheumatol 2001; 28: 1056-62.
13. Nikiphorou E, Ramiro S. Work Disability in Axial Spondyloarthritis. Curr Rheumatol Rep 2020; 22: 55.
14. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. Acta Psychiatr Scand 1983; 67: 361-70.
15. Calin A, Garrett S, Whitelock H, et al. A new approach to defining functional ability in ankylosing spondylitis: the development of the Bath Ankylosing Spondylitis Functional Index. J Rheumatol 1994; 21: 2281-85.
16. Duruöz MT, Doward L, Turan Y, et al. Translation and validation of the Turkish version of the Ankylosing Spondylitis Quality of Life (ASQOL) questionnaire. Rheumatol Int 2013; 33: 2717-22.
17. Reilly MC, Zbrozek AS, Dukes EM. The validity and reproducibility of a work productivity and activity impairment instrument. Pharmacoeconomics 1993; 4: 353-65.
18. Reilly MC, Gooch KL, Wong RL, Kupper H, van der Heijde D. Validity, reliability and responsiveness of the Work Productivity and Activity Impairment Questionnaire in ankylosing spondylitis. Rheumatology (Oxford) 2010; 49: 812-9.
19. Cakar E, Taskaynatan MA, Dincer U, Kiralp MZ, Durmus O, Ozgül A. Work disability in ankylosing spondylitis: differences among working and work-disabled patients. Clin Rheumatol 2009; 28: 1309-14.
20. Macfarlane GJ, Shim J, Jones GT, Walker-Bone K, Pathan E, Dean LE. Identifying persons with axial spondyloarthritis at risk of poor work outcome: results from the British Society for rheumatology biologics. J Rheumatol 2019; 46: 145-52.
21. de Hooge M, Ramonda R, Lorenzin M, et al. Work productivity is associated with disease activity and functional ability in Italian patients with early axial spondyloarthritis: an observational study from the SPACE cohort. Arthritis Res Ther 2016; 18: 265.
22. Haglund E, Bremander A, Bergman S, Jacobsson LT, Petersson IF. Work productivity in a population-based cohort of patients with spondyloarthritis. Rheumatology (Oxford) 2013; 52: 1708-14.
23. Nikiphorou E, Boonen A, Fautrel B, et al. How do clinical and socioeconomic factors impact on work disability in early axial spondyloarthritis? Five-year data from the DESIR cohort. Rheumatology (Oxford) 2022; 61: 2034-42.
24. Nikiphorou E, Carvalho PD, Boonen A, et al. Sick leave in early axial spondyloarthritis: the role of clinical and socioeconomic factors. Five-year data from the DESIR cohort. RMD Open 2021; 7: e001685.
25. Espahbodi S, Bassett P, Cavill C, Freeth M, Hole J, Sengupta R. Fatigue contributes to work productivity impairment in patients with axial spondyloarthritis: a cross-sectional UK study. Clin Exp Rheumatol 2017; 35: 571-8.